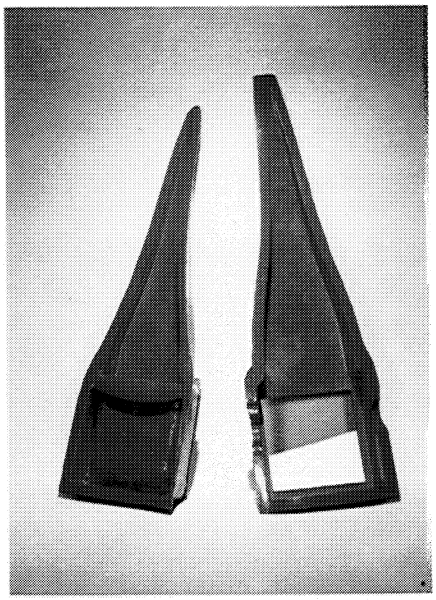
Aircraft Inlet Ducts

The above photo shows the nose section of a Mooney 231 turbocharged lightplane that has been modified to incorporate air inlet ducts (one shown in top photo) and an intercooler (heat exchanger) to increase engine efficiency. The modification, intended to improve the performance of turbocharged lightplanes over that of standard production models, was designed by Wilhelm Cashen of Roseburg, Oregon and based on NASA technology. Modification kits, including the ducts (left) and the intercooler system are marketed and installed by Turboplus Inc., Auburn, Washington.



In this and similar lightplane installations, the two submerged ducts introduce cool "ram" air to the propulsion system for greater operating efficiency. One duct feeds ram induction air to the turbocharger compressor, the other provides cooling air to the intercooler assembly. The compressor-heated induction air is then routed to the intercooler, where heat is extracted by the cooling air. This air cooling technique results in increased air density, requiring less manifold pressure for a given horsepower and elevating critical altitude by several thousand feet. Lower manifold pressure and lower temperature allow the engine to operate with a leaner fuel mixture for substantially improved fuel efficiency. Additionally, lower cylinder, oil and exhaust gas temperatures promote longer engine life and reduced maintenance costs.

Wilhelm Cashen had designed a heat exchanger for light turbocharged aircraft but he faced a problem in designing a method for drawing in cool ram air. He needed an inlet with very low drag to cool the engine without adversely influencing the aerodynamic characteristics of the airplane. Cashen found the information he needed in the NASA publication *Tech Briefs* (see page 118). After studying three *Tech Briefs* reports on NASA submerged duct technology developed for high performance aircraft, he was able to adapt the technology to the induction/intercooler system.